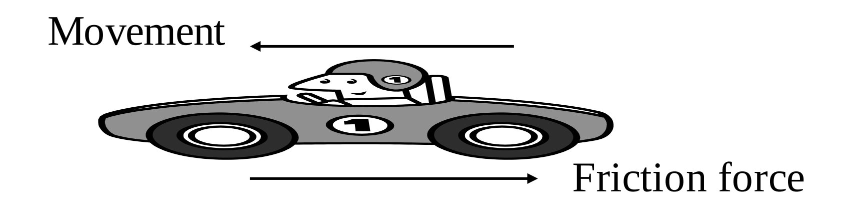
Unit one
Lesson 1
Friction force

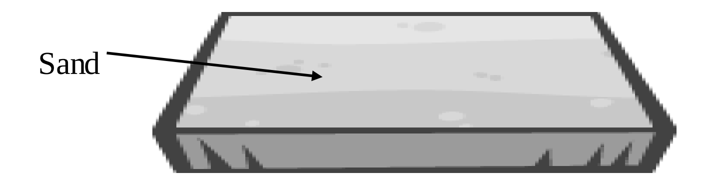
The friction force:

- ☻ It is the amount of force that exists between two surfaces and it affects the movement of objects in the opposite direction.

☻ A force that slows down the moving object and has its effect in **the opposite direction.**



Examples





Ceramic

- ***When a ball moves on two different floors:***

A) Moves on your sandy floor of the playground.

- The ball stops moving after a short time.

B) Moves on the smooth floor of the classroom.

- The ball keeps moving for a long time.

Give reasons:

1- The ball which moves on sandy floor stop after a little time.
Due to the friction force which affects in the opposite direction of the movement of the ball.

2- When you ride a bike and left your feet from the pedal the speed decrease gradually.
Due to the friction force which slows down the bike speed.

☻ Complete:-

1- ……………………………..………… arises when two surfaces touch each other.
2- The effect of the friction force is in the ……….….. direction to the movement.

- There are two types of friction force:

Notes	High friction	Low friction
The shape		
slope	- Decrease the slope.	- Increase the slope.
Friction force	- The friction force is larger than the movement force.	- The friction force is smaller than the movement force.
Observation	- The cube doesn't move.	- The cube moves.

- **When the cube moves downwards.**
  the direction of the friction force is upwards.
- As the slope of the surface increases the friction force decreases.

The relation between the friction and type of material of the surface

- If you throw a rubber ball on a dry cement floor.
- Then throw it again on a wet cement floor with the same strength.

⟶ The ball will move for a ***longer distance*** in case of wet cement floor.

Complete:-

1- When the friction force is .... than the movement force, the body doesn't move.

2- When the friction force is .... than the movement force, the body move.

3- There is a .... between the bicycle tires and the playground.

Give reasons:

1- The ball which thrown on wet cement moves for a longer distance than dry cement.

Because the friction force between ball and wet cement is less than the friction force between the ball and the dry cement.

The factors affecting the friction force:

1- The surface area of the moving body. (Direct relation)

The surface area	The friction force
Increase	Increase
Decrease	Decrease

2- The type of the material surface.

The type of the material surface	The friction force
Rough	Increase
Smooth	Decrease

3- The speed of the body. (Direct relation)

The speed of the body	The friction force
Increase	Increase
Decrease	Decrease

Give reason:-

1- There's a direct relation between the surface area of the moving object and the friction force.

Because by increasing the surface area, the friction force increases and vice versa.

2- The ball moves on the classroom floor for a longer distance than on the playground.

Because the friction force is higher in case of the rough surfaces



(playground) than in case of the smooth surfaces **(Classroom)**.

The disadvantages of the friction :

- Mention the disadvantages of the friction force?

- The friction increases the temperature of the internal moving parts of machines.
- So machines are damaged.
- And a lot of money is wasted.

Give reason:-

1- Friction causes damage to most of machines.

Because it rises the temperature of the internal moving parts of machines so it damaged.

Ways to decrease the friction force

A) Using lubricants and oil.

- They form a thin layer between the internal moving parts of machines to decrease the friction force.

B) Using a ball bearing.

- Technicians put ball bearing between the internal moving parts of machines to decrease the friction force.
- It puts in the car axis.
- It transmits the motion from the car engine to the wheels.

Ball bearing: A set that is formed of a group of small metallic balls which have smooth surfaces.

Give reason:

- **Ball bearings are used between the surfaces of the moving parts in machines.**
- **Lubricants and oil are used in the mechanical machines.**

To decrease the friction force between the internal moving parts of machines.



Worksheet on lesson 1

1- Complete the following:

1- Friction force has its effect on ……………… direction of the object motion.
2- The value of ……………………between two surfaces depends on types of material of both surface.
3- Technicians put ………………… between …………….. to decrease the friction force.
4- The friction force between two surfaces is ………………. while moving.

2- Write the scientific term:

1- The force that slows down the moving object and has its effect in the opposite direction of the objects motion.
2- A set of small balls of smooth surfaces are put together between the internal surfaces of machines.

3 - Choose the correct answer:

1-To decrease friction force we use …………
(oil – lubricants- ball bearing – all of them)
2- Which surfaces of the following have the greatest friction force?
(Glass and glass – Rubber and dry cement – Rubber and wet cement – Glass and wet cement)

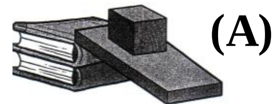
4- Give reasons:

1- Oil and lubricants are used in machines.
……………………………………………………………………………………
2- There is a direct relation between the surface area and the friction force.
……………………………………………………………………………………..
……………………………………………………………………………………..
3- Friction force has many disadvantages.
……………………………………………………………………………………..
4- Ball bearings are used between the moving parts in machines.
……………………………………………………………………………………..

5- Put (√) or (X):

1- The friction force is always in the same direction of the object movement.
2- The friction force depends on the shape of the surfaces of touching objects.
3- Oil is used to decrease the friction force.

6- Look at the opposite figures, then answer the following :


(A)

1- The cube in figure (A) …………………..
because the friction force is ……….. than the movement force.


(B)

2- The cube in figure (B) …………………..
because the friction force is ……….. than the movement force.

Lesson 2
Friction applications

☻ Friction is not found only between solids, but there are many types of friction.

Types of friction

1- Friction between a solid object and air.

- When a solid object moves in air, **a friction force** arises between the object and air.

- This type of friction is called **"air resistance"** and it acts in the **opposite direction** of the body movement.

Air resistance:

It is the friction force resulting from the movement of solid objects through air.

☻ The factors affecting air resistance:

1-The speed (velocity) of the body.

By **increasing** the **speed** of the body that moves through air, **air resistance increases.**

What happen:

When the amounts of both the force of air resistance and the force that moves the car are equal.

The car moves with a **constant** velocity.

2-The surface area of the body.

- By **increasing the surface area** of the body that moves through air, air



resistance increases and vice versa. **Direct relation)**

G.R:

There is a direct relation between the surface area of the moving body through air and air resistance.

Because by increasing the surface area of the moving body, air resistance increases.

☻ life applications :

1. **Rockets aircrafts and trains are designed in streamline shape.(G.R)**
   To decrease air resistance.
2. **Birds have streamline shapes.(G.R)**
   To decrease air resistance.
3. **Parachutist opens the parachute to land safely.(G.R)**
   To increase air resistance by increasing its surface area and falling speed decreases.
4. **Birds stretch their wings on landing.(G.R)**
   To increase air resistance by increasing their surface area, where this causes a decrease in their speed on landing.

G.R:

- **Rockets and aircrafts are designed in streamline shapes.**
- **Bodies of birds have streamline shapes.**

To decrease air resistance.

2- Friction between a solid object and water.

- When any object moves through water (as fish and ship), **a friction force** arises between this object and water.

- This friction force is called **"water resistance".**

Water resistance:

It is a friction force resulting from the movement of any object through Water.

Note:

-The direction of water resistance is in the **opposite** direction of the movement.

☻ The factors affecting water resistance :

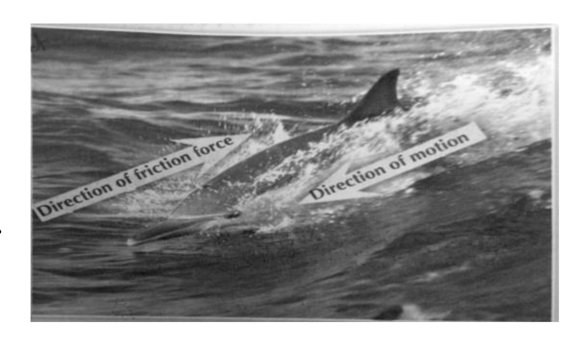


1-The speed of the body through water.

By **increasing the speed** of the body through water, **water resistance increases** and vice versa. **(Direct relation)**

2-The surface area of the body.

By **increasing the surface area** of the body that moves through water, **water resistance increases** and vice versa. **(Direct relation)**



☻Life application :

1- Fish have streamline shapes.

2- Ships are designed in streamline shapes.

G.R:

1- The importance of the streamline shape of fish and ships.

To decrease water resistance.

The advantages of friction:

Friction force is necessary because:

1. It helps in moving and stopping cars or bicycles.
2. It enables us to control the car speed and to change the car direction.
3. It enables us to walk as the friction between our shoes and the ground **prevents us from slipping down.**
4. Lighting of a match.



Worksheet on lesson 2

1- Complete the following:

1- The friction force between the air and the object that moves through is called …………………………… .

2- The factors affecting the air resistance are ………………………………………. and ……………………………………………….. .

3- The air resistance …………………… when the velocity of the body increase.

4- From the advantages of friction are ……………………., ……………………….. and ……………………………………….. .

2- Write the scientific term:

1- A friction force between air and the moving object through.

2- A friction force between water and the moving object through.

3- Give reasons:

1- The fish has a streamline shape.

…………………………………………………………………………………….

2- Rockets and aircraft have a streamline shape.

…………………………………………………………………………………….

3- Car movement needs friction.

…………………………………………………………………………………….

4- The friction force has many advantages.

…………………………………………………………………………………….

4- Put (√) or (X) then correct the underlined words:

1- The moving car is affected by air resistance <u>in the same direction</u> of its movement.

2- The air resistance decreases when the car moves <u>so fast.</u>

3- When the friction force between the air and a car is <u>more than</u> the force that moves it, the car moves at a constant velocity.

4- When the parachutist opens his parachute, the friction force <u>decreases.</u>

5- Air resistance to the objects move in high speeds can not observed.
6- The relationship between the area of the object surface exposed to the air and the air resistance of its movement is an inverse relation.
7- When the friction force between the air and a car is equal to the force that moves it, the car moves at a constant velocity.

Unit two
Lesson 1
The human circulatory system

Its function:

☻ It transports the digested food, oxygen and water to all the body cells.
☻ It carries (carbon dioxide gas, water vapour and wastes) away to special organs in your body to get rid of them.
☻ It helps in maintaining (keeping) the body health.

Write the scientific term:

The system that transports the digested food, oxygen and water to all the body cells and carries the wastes away from the body cells.
(……………………………..…………)

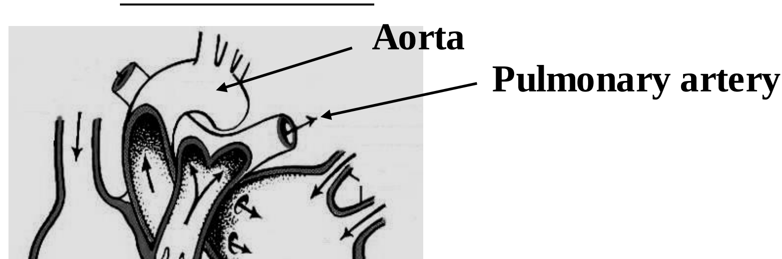
Circulatory system consists of

The heart	The blood	The blood vessels

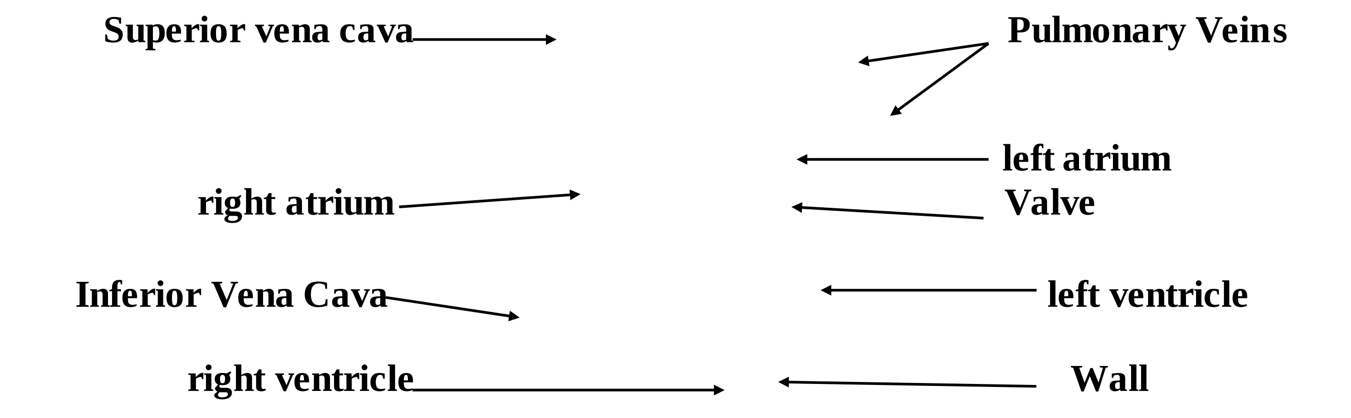
A) The heart:

☻ It is a strong muscular hollow organ (muscular pump).
☻ Equals about the size of your fist.
☻ It is located within (inside) the chest cavity between the two lungs.
☻ It pumps the blood continuously through out the body.

The heart







Structure of the heart

- Heart has 4 chambers (rooms) and 2 sides, the right side and the left side.
- The upper chamber in each side is called **atrium.**
  The lower chamber in each side is called **ventricle.**
- There is **a wall** that separates between the left side and the right side.
- There is **a valve** between each atrium and ventricle.

Give reason:

1- There is a wall between the left side and the right side.

To prevent mixing the blood in both sides.

2- There is a valve between each atrium and ventricle.

To allow the blood to pass from the atrium to ventricle, not returning back.

Write the scientific term:

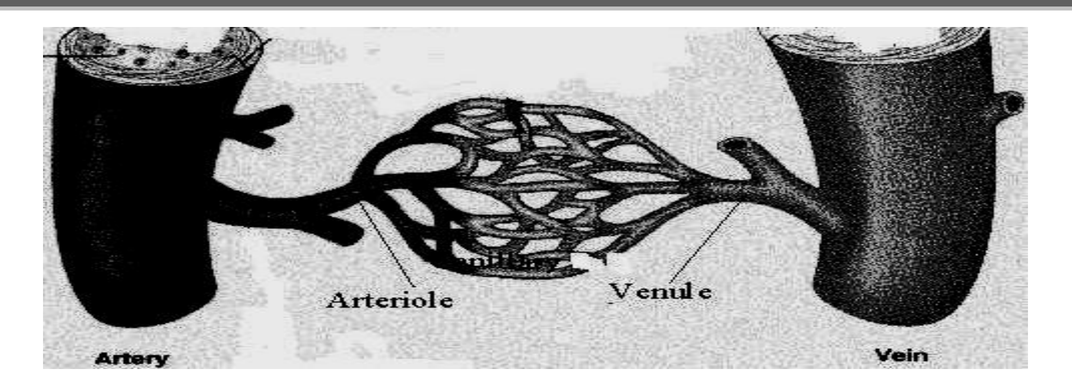
1- The pump of blood throughout the body. (The heart)

B) The blood vessels:

Arteries	Veins	Blood capillaries
• Carry the blood from the heart to all the body parts.	• Carry the blood from all the body parts to the heart	• Connect the ending of arteries to the beginnings of veins.
• They are thick blood vessels.	• They are thin blood vessels.	• Have very thin wall.
• All arteries carry blood rich in oxygen gas except the pulmonary artery which carries	• All veins carry blood rich in carbon dioxide gas except the pulmonary veins	• Network of tiny blood vessels with very thin walls. • Located within the tissues



blood rich in carbon dioxide gas.	which carry blood rich in oxygen gas.	and around the cells.
• Emerges from the two ventricles. • Large and wide at the beginning, but become smaller at end.	• Open (enter) in the two atria. • Smaller at the beginning and become larger.	**Function:** their thin walls allow the blood to deliver food and oxygen to the cells and carries carbon dioxide and wastes.
☻ Aorta. ☻ Pulmonary artery.	☻ Pulmonary veins. ☻ Superior and inferior vena cava.	



Blood vessels:

The network of pipelines that extends all over the human body.

Give reason:

1- The blood capillaries have very thin walls.

To allow the blood to deliver food and oxygen to the cells and carries carbon dioxide and wastes.

Notes:

1- The four chambers of the heart are always fall of blood and connected to the **blood vessels.**

2- **Atrium** receives the blood from veins.

3- **Ventricle** pumps the blood through arteries.



4- **Arteries** end with blood capillaries.

5- **Veins** begin with blood capillaries.

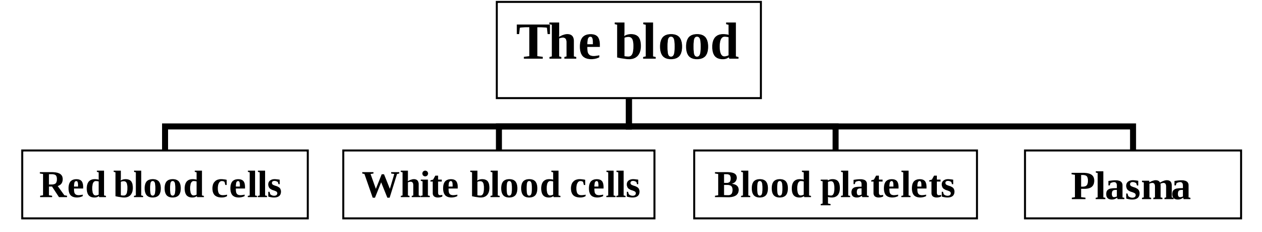
6- Arteries start from the **heart** and end in **blood capillaries.**

7- **Pulmonary artery** carries blood rich in carbon dioxide.

8- All veins carry blood rich in **carbon dioxide gas** except **the pulmonary veins** carry blood rich in oxygen gas.



- ❖ It is a red liquid.
- ❖ Carries digested food and oxygen to all parts of the body and gets rid of the wastes resulting from the breaking down of food.



A) Red blood cells:

- They are red cells without nuclei.
- Carry oxygen gas from lungs to all the body cells, and carry carbon dioxide gas from the cells to the lungs.

B) White blood cells:

- They are white cells with nuclei.
- Defend the body against microbes by attacking them.

C) Blood platelets:

- They are small-sized cells fragments.
- Has a role in coagulation of the blood (forming a blood clot) when the body is wounded.

- When the body is wounded and the blood is exposed to the air, this prevent the bleeding and help in healing the wounds.

D) Plasma:

- A yellow watery fluid of the blood that all components are suspended.
- Carries the digested food that cells need.
- Carries the harmful wastes that formed by breaking down of food to get rid of them.

Give reason:

1- The blood platelets have an important role.

Because they help in coagulation of the blood when the body is wounded and prevent the bleeding.

2- White blood cells have an important role in the body.

Because they defend the body against microbes by attacking them.

3- Blood is a fluid.

Due to the presence of plasma which is a watery fluid.

The general functions of blood :

1- Transfer and deliver the materials to all the body cells.

2- Defend the body against microbes.

3- Keeps the temperature of the body constant.

Mention one function for each of the following:

1- Plasma.

It carries the needed food substances to the body cells.

2- Blood platelets.

They help in blood coagulation and healing wounds.

3- Red blood cells.

They carry oxygen gas from the lungs to all the body cells.

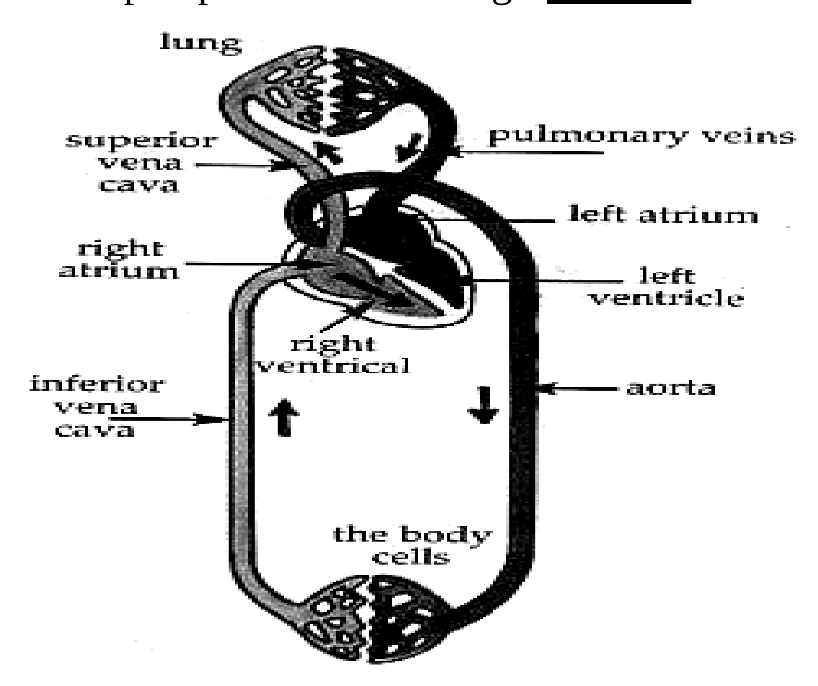
4- White blood cells.

They defend the body against microbes by attacking them.

The path of blood through the heart

❖ The two atria receive the blood through **veins.**

❖ The two ventricles pump the blood through **arteries.**



Blood circulation It is the path of blood through out the body.

Lungs ⟶ **Pulmonary veins** ⟶ **Left atrium**
↓
Left ventricle ⟶ **Aorta** ⟶ **All the body cells**
↓
Superior and inferior vena cava ⟶ **Right atrium**
↓
Right ventricle ⟶ **Pulmonary artery** ⟶ **Lungs**

Notes:

- ✓ The left side of the heart contains **blood rich in oxygen gas.**
- ✓ The right side of the heart contains **blood rich in carbon dioxide gas.**
- ✓ Each atrium **receives** the blood.
- ✓ Each ventricle **pumps** the blood.

Give reason:

1- The wall of the left ventricle is more thicker than the right ventricle.

Because the left ventricle pumps the blood to all the body cells, while the right ventricle pumps the blood to the two lungs only.



The blood circulation can be divided into:

The minor (pulmonary)
Blood circulation
It is the blood circulation between the heart and the two lungs.

The major (systemic)
Blood circulation
It is the blood circulation between the heart and all body parts.

The heart beats:



- ❖ The number of heartbeats at rest is **70 beats** Per minute.
- ❖ During **exercising** , the rate of your heartbeats **increase** to provide the body cells with oxygen and food needed to produce more energy.

Give reason:

1- The rate of heartbeats increases during exercising.
To provide the body cells with oxygen and food needed to produce more energy.

How to maintain the circulatory system?

- ☻ Keep exercising to strong the heart and activates the blood circulation.
- ☻ Eat healthy and balanced food that is low in fat and salt.
- ☻ Eat more fresh fruits and vegetables that rich in iron to avoid anaemia disease.
- ☻ Drink a suitable amount of clean water.
- ☻ Avoid smoking and smokers.
- ☻ Avoid exposure to infections and accidents.
- ☻ When wounded, try to stop bleeding and get treatment.

Give reason:

1- We must avoid smoking.
To keep the circulatory system healthy as smoking:
- Harms the heart. – Weakens the blood circulation.

2- Eat more fresh and clean vegetables and fruits that rich in iron.
To avoid the infection with anaemia disease.

Worksheet on lesson (1)

1- Complete the following statements:

1- The circulatory system consists of ………… , ………….. and…………… .
2- Heart is located within the …………..… cavity between the …………….. .
3- Heart is composed of ………… sides and ………… chambers filled with ……………… and connected with ……………… .
4- There is a valve between ……………… and …………….of the heart.
5- Blood flows inside a network of pipelines called ………………… .
6- The types of blood vessels are …………….. , …………….and…………. .
7-The blood vessels that emerge from the heart are called ………………… .
8- The blood vessels which collect the blood from all body organs to the heart called ………………. .
9- The blood is composed of ……………. , ……………… , ………………. and……………….. .
10-The blood cells which attack the microbes that cause diseases to humans are ………………….. .
11-Blood platelets form ………………..….... which help in healing wounds.
12-All arteries carry blood rich in oxygen gas except ………………
13-All veins carry blood rich in carbon dioxide except ……………………..
14-The heart is a muscular organ in the size of ………
15-When left atrium contracts, it pushes the blood to the …………….
16-Left ventricle pushes the blood into the ………………

2- Write the scientific term:

1- A muscular organ about the fist size.
2- The two lower chambers of the heart.
3- The pipelines that extend all over the human body.
4- The artery that carries blood rich in carbon dioxide.
5- The cells that have no nuclei.
6- The small bodies that play an important role in the blood coagulation.
7- A yellow watery fluid in which blood cells float.
8- The blood vessels that collect blood from all the body parts to the heart.
9- The cells which carry oxygen gas.
10-The flow of blood to the lungs and its returning back again to the heart.

3- Give reasons:

1- Left ventricle has thicker wall than right ventricle.

....

2- The two sides of the heart are separated.

……………………………………………………………………………...

3- Blood is liquid.

……………………………………………………………………………

4- Heart contains valves.



……………………………………………………………………………………...

5- Blood capillaries have thin walls.

……………………………………………………………………………………...

6- Blood platelets are very important.

……………………………………………………………………………………...

7- White blood cells keep your body healthy.

……………………………………………………………………………………..

8- Smoking must be avoided.

……………………………………………………………………………………...

4- Label the diagram:

1- …………………………………..
2- ………………………………….
3- ………………………………….
4- ………………………………….
5- ………………………………….
6- ………………………………….
7- ………………………………….
8- ………………………………….
9- …………………………………. 10- ………………………………...

5- Mention one function for each of the following:

1- Plasma.

……………………………………………………………………………………...

2- Blood platelets.

……………………………………………………………………………………...

3- Red blood cells.

……………………………………………………………………………………...

4- White blood cells.

……………………………………………………………………………………...

5- Pulmonary artery.

……………………………………………………………………………………...

6- Valve.

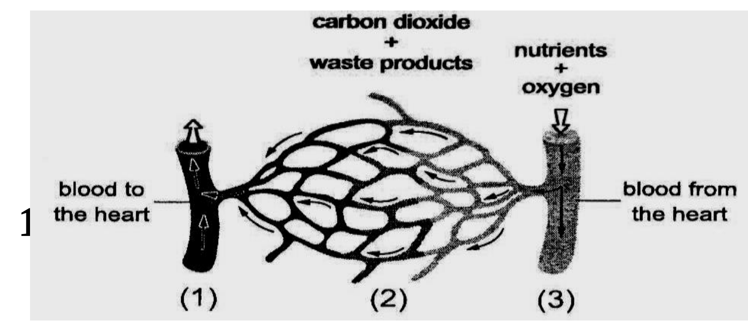
……………………………………………………………………………………...

7- Wall.

……………………………………………………………………………………...

6- In the opposite drawing:-

1) ……………………………….
2) ………………………………..



3) ……………………………….

Lesson 2
Excretion and human urinary system

Excretion process

It is the process of getting rid of harmful wastes (Carbon dioxide, Water vapour and urine).

Write the scientific term:

1- They are useless materials that go to the blood to be expelled out of the body. (Excretory materials)
(Cell wastes)

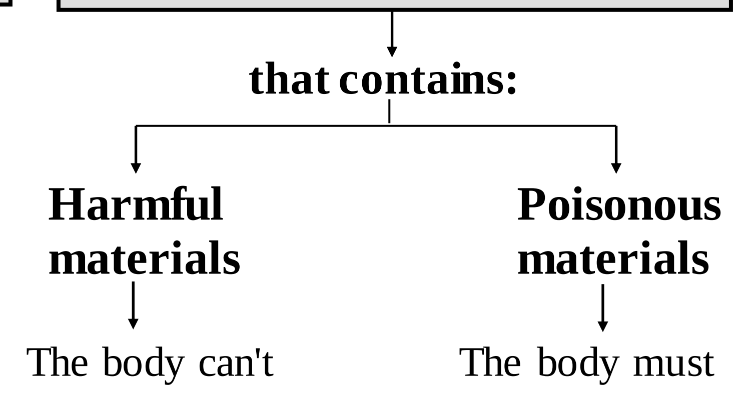
There are two types of wastes:

1- Solid wastes.

- They are the indigested food that stored in the large intestine until it passes out of the body.

2- Excretory materials.

- They are the waste materials that produced inside the body cells and the body must get rid of them.





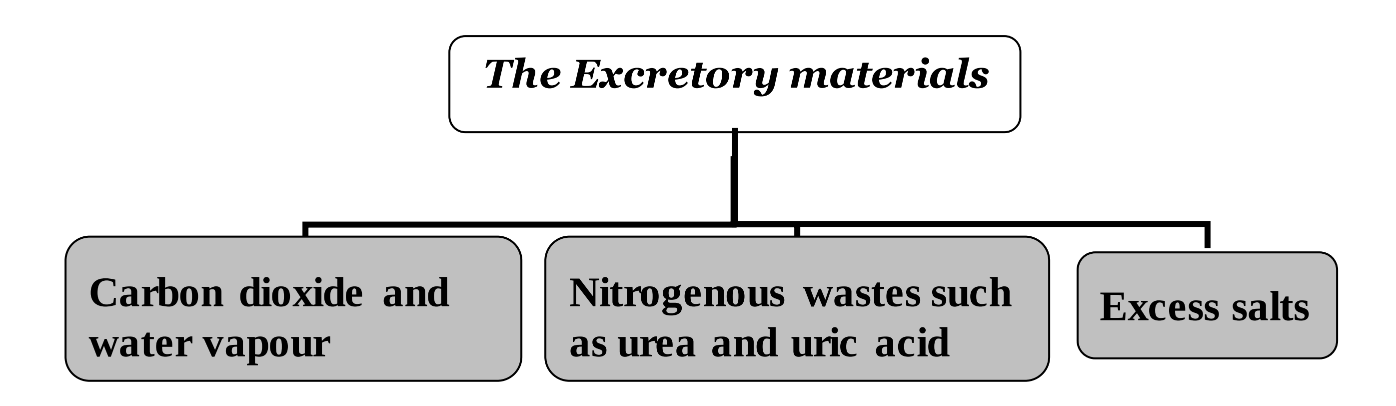
use them. get rid of them.

Write the scientific term:

1- The group of organs that clarifies the body from the wastes and harmful substances.

2- The system that clarifies blood from excess salts, urea and uric acid.

(Urinary system)



Solid wastes

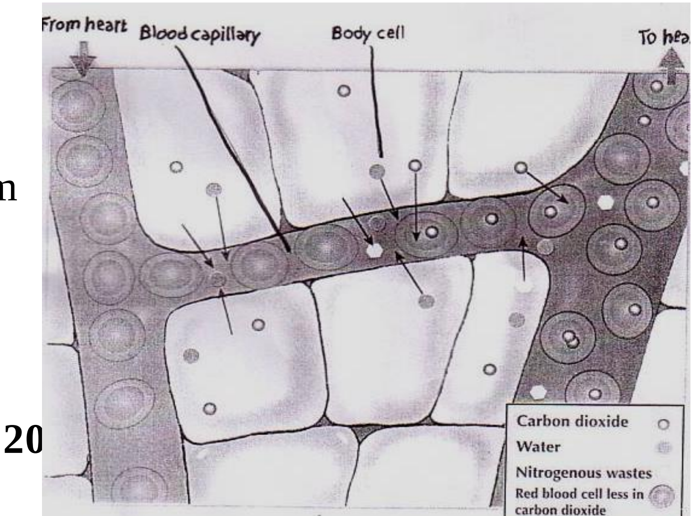
- ❖ Materials from food that your body cannot digest (The indigested food).
- ❖ Stored in large intestine before passing out of your body.

Getting rid of excretory materials

- ❖ The body cells transfer the wastes into the blood through the thin walls of blood capillaries.
- ❖ The blood carries cell wastes to special organs to get rid of the wastes.

Excretory organs

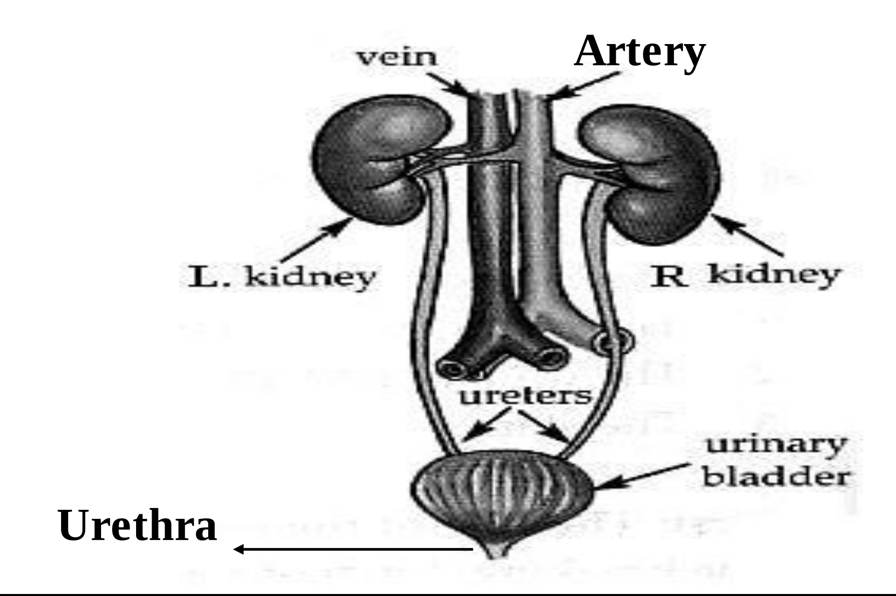
- ❖ Carbon dioxide gas exhaled from the ***lungs.***
- ❖ Excess salts are expelled out in form of sweat from the ***skin and urinary System***.
- ❖ Nitrogenous wastes



Comes from break down of protein (urea and uric acid) are removed by the ***kidneys*** or ***urinary system***.

The role of urinary system in excretion process

- ❖ It located in the abdominal cavity near the backbone.
- ❖ It filter the blood from excess salts, urea, uric acid and other waste materials.



The organ	The function
Two kidneys	❖ They are bean-shaped organs. ❖ One at each side of backbone. ❖ Filter the blood from urea, uric acid, excess salts and other waste materials in the form of urine. ❖ Each kidney have 1 million minute tubules top filter the blood
Two ureters	❖ Two narrow tubes that carry urine from the kidneys to the urinary bladder.
Urinary bladder	❖ A balloon like a sac that receives urine from the ureters. ❖ Stores urine until it is released from the body to the outside through the urethra.
Urethra	❖ A tube extend from urinary bladder and open outside



	the body to remove the urine .
Vein	❖ Transports pure blood which is filtered by the kidneys to the heart.
Artery	❖ Carries blood contains wastes to the kidneys.

Getting rid of the excess salts

❖ The body gets rid of ***excess salts*** and some other excretory products by secreting ***sweat*** by a ***sweat gland*** which exists in the ***skin.***

How to maintain the urinary system healthy ?

❖ Drink a suitable amounts of clean water.
❖ Eat healthy and balanced food, low in salt.
❖ Avoid schistosomiasis disease (bloody urine) by keeping away from canals.
❖ Don't keep urine for long periods, because this affects the function of kidney.



Worksheet on lesson (2)

1- Complete the following statements:

1- Kidneys are located on both sides of …………………. .
2- The kidney excretes the wastes dissolved in water in the form of ……..… .
3- ……………. is connected with the kidney and carries the urine into …..… .
4- Lungs help the body to get rid of ……….……… and ………………..…… .
5- Urine consists of water containing salts,……………,………… and……… .

6- Sweat consists of …………………..…and ………………..…… .

7- The skin helps the body to get rid of …………………….. .

8- The tube which extends from the bladder and opens outside the body is called ……………………… .

2- Write the scientific term:

1- The group of organs that clarifies the body from the wastes and harmful substances.

2- The fluid which the kidneys produces and contains harmful substances.

3- The narrow tubes which connects with kidney and urine passes through it.

4- The two organs which excrete carbon dioxide gas and water vapour.

5- A tube extends from urinary bladder to outside.

6- Two narrow tubes connect between kidney and urinary bladder.

3- Give reasons:

1- Kidney is an important organ in the urinary system

……………………………………………………………………………...

2- We should drink enough water.

……………………………………………………………………………

3- Skin is one of the excretory organs.

……………………………………………………………………………

4- Man urinates less in summer than winter.

……………………………………………………………………………..

4- Mention one function for each of the following:

1- Two kidneys.

……………………………………………………………………………...

2- Two ureters.

……………………………………………………………………………...

3- Urinary bladder.

……………………………………………………………………………...

4- Urethra.

……………………………………………………………………………...

5- Label the diagram:

1- …………………………….

2- ……………………………..

3- ……………………………..

4- ……………………………..

(1)
(2)
(3)
(4)